

**Semi-Annual Progress/Technical Report for
Great Lakes Observing System (GLOS) Coordination**

Award Number: NA05NOS47311666

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Reporting Period: December 1, 2005 – May 31, 2006

This reporting period is for the six-month period identified above which is part of the first year of a three-year grant period. During this reporting period, the Great Lakes Commission (GLC), acting as the Secretariat for GLOS and in conjunction with the GLOS Steering Committee (GLOS-SC) and the GLOS Board of Directors, met all of its obligations under the grant. This progress report provides detailed information on how these obligations were met.

The Great Lakes Observing System Regional Association (GLOS-RA) is now a non-profit corporation registered in the State of Michigan, established to advance the goals and objectives of the U.S. Integrated Oceans Observing System (IOOS) across the Great Lakes – St. Lawrence River system. IOOS in turn is the U.S. oceans, coastal and Great Lakes component of the Global Earth Observing System of Systems (GEOSS).

The GLOS-RA is made up of wide variety of stakeholders across the region, including federal, state and municipal governmental agencies, Native American communities, academic institutions, commercial ventures and a host of users of the regional resources.

Meetings, Workshops and Conferences Conducted or Attended:

Four key events were conducted or attended during this reporting period that affected GLOS planning, systems integration and regional data management and communications (DMAC) design and implementation.

- Great Lakes Regional Collaboration (GLRC) - On December 12, 2005, the GLRC conducted a summit conference in Chicago, Ill., to release its strategy report for restoring and protecting the ecological resources of the Great Lakes. Initiation of GLOS as the regional component of IOOS and GEOSS was prominent in the recommendations in this report. The report reflects the work of more than 1,500 Great Lakes stakeholders and 12 months of consensus building. The GLRC was convened by the Great Lakes Interagency Task Force to provide stakeholder input as required in the Presidential Executive Order creating the task force. NOAA plays a key role on the Task Force.

- HEC Modeling Workshop - On March 16-17, 2006, GLOS hosted a technical workshop in Port Huron, Mich., to identify needs, collaborative opportunities and prospective implementation mechanisms for integrating observing system improvements, source water protection monitoring and hydrodynamic modeling in the lakes Huron to Erie Corridor (HEC). The corridor includes, from north to south, the St. Clair River, Lake St. Clair and the Detroit River. All seven IOOS societal objectives would be met by advancing this integration effort. The workshop was attended by more than 50 representatives of federal, state, provincial, regional and local government agencies in southeast Michigan and southwest Ontario. The engagement of U.S. national assets in this area has been recognized by local interests and has high congressional interest. The importance of promoting IOOS as a significant player in this integration effort was showcased.
- Regional Data Exchange (RDX) Conference - On April 4-6, 2006, the GLOS Secretariat staff co-hosted the RDX '06 Conference in Rochester, NY. The three-day conference showcased remote sensing applications across the region. Approximately 140 individuals attended with several plenary and break-out sessions discussing IOOS and GLOS activities, including initiation of the openIOOS testbed, national DMAC development, and NOAA CoastWatch operations. Much of these discussions are vital for design and integration of the GLOS remote sensing and DMAC sub-systems.
- US/EU Baltic International Observing System Symposium and EU Water Framework Directive – GLOS Secretariat staff attended the Baltic Symposium in Klaipeda, Lithuania, on May 22-25, 2006, as part of the Ocean.US delegation and presented information on GLOS program activities to its international attendees. The Great Lakes and Baltic states have had a longstanding “sister” relationship, with the GLC having observer status on the Helsinki Commission (HELCOM). The Great Lakes and Baltic states have common interests on climate, commerce, environmental protection and periodically compare approaches to collecting and managing resource information. GLOS Secretariat staff also met with representatives of the Coastal and Marine Resources Center (CMRC), University College in Cork, Ireland, on May 29, 2006. Both CMRC and GLOS are working on respective coastal components of the global ocean observing system and have similar needs for integrated mapping projects. Integrated ocean observing and data management are cornerstones of the European Union’s Water Framework Directive, which is a valuable example of Regional Ocean Governance concepts, which can be applied in the Great Lakes region.

In addition to these meetings, the GLOS-SC and Secretariat staff participated in the following events with a focus on coordinating GLOS planning and implementation:

- Great Lakes Association of Scientific Ships / Great Lakes Captains Association Industry Days – January 25-27, 2006, in Traverse City, Mich.;
- Binational Executive Committee Meeting – February 8-9, 2006, in Chicago, Ill.;

- NOAA Needs Assessment planning team meetings – February 13-14, 2006, in Ann Arbor, Mich.;
- Great Lakes Environmental Summit – February 14-15, 2006, in Washington, D.C.;
- Detroit / Wayne County Port Authority, planning for new education center – February 28, 2006, Detroit, Mich.;
- Lake Erie Millennium Network Conference – February 28-March 2, 2006, in Windsor, Ontario;
- Detroit/Wayne County Envision planning meeting – February 28, 2006, in Detroit, Mich.;
- National Federation of Regional Associations (NFRA) Meeting – March 9-10, 2006, in Washington, D.C.;
- Great Lakes Congressional Breakfast / Great Lakes Day – March 14-16, 2006, in Washington, D.C.;
- Macomb/St. Clair Inter-County Water Quality Advisory Board meeting – March 28, 2006, in Mt. Clemens, Mich.;
- Ocean Research Priority Plan Workshop – April 18-20, 2006, in Denver, Colo.;
- Great Lakes Commission Semiannual Meeting – May 2-4, 2006, in Sheboygan, Wis.; and
- Annual Conference of the International Association for Great Lakes Research – May 22-25, 2006, in Windsor, Ontario.

Project tasks addressed during the reporting period:

A) Regional Association Establishment, Membership and Staffing

The Commission has continued to coordinate interagency and user involvement to initiate the GLOS-RA and its inaugural GLOS Board of Directors. The GLOS Steering Committee elected 12 members to the GLOS Board in April 2006. They are listed below with their affiliations.

Dr. Alfred Beeton, Scientist Emeritus, NOAA Great Lakes Research Laboratory, Ann Arbor, MI
 Dr. Jeffrey Boehm, Vice President, John G. Shedd Aquarium, Chicago, IL
 Dr. Gerald Galloway, University of Maryland, College Park, MD
 Mr. Mark Grazioli, retired Principal, Wade Trim Consulting Engineers, Grosse Ile, MI
 Mr. Philip Keillor, retired Coastal Engineer, WI Sea Grant, Madison, WI
 Dr. Gail Krantzberg, McMaster University, Toronto, ON
 Dr. Frank Kudrna, Kudrna & Associates Consulting Engineers, Chicago, IL
 Mr. Dale Phenicie, Council of Great Lakes Industries, Peachtree City, GA
 Dr. Harvey Shear, University of Toronto, Mississauga, ON
 Dr. Richard Stewart, University of Wisconsin-Superior, Superior, WI
 Mr. Nelson Thomas, retired Water Quality Specialist, U.S. Environmental Protection Agency, Duluth, MN
 Mr. Bill Werick, retired Planner, U.S. Army Corps of Engineers, Culpepper, VA

The GLOS Board has a diverse and in-depth background on Great Lakes issues, ranging from economic development, industrial pollution control, municipal water system operations,

ecological protection, binational coordination, public education and tourism, project plan formulation and implementation, and stakeholder conflict resolution. The GLOS-RA is well positioned to address the diversity of needs of the Great Lakes – St. Lawrence River system.

During this reporting period a revised GLOS governance model and related bylaws were developed, vetted and approved by the GLOS-SC. The alternative GLOS governance model provides protection against most conflicts of loyalty/interest by “firewalling” GLOS members who would gain financial benefit from the endeavor from the fiduciary decisionmaking process. This governance model does, however, provide the GLOS membership active participation in influencing resource allocation priorities.

Articles of Incorporation to create a Non-Profit Corporation in the State of Michigan were filed in February 2006. An application for 501(c) 3 tax-exempt status through the Internal Revenue Service still needs to be submitted.

Initial drafts of roles/responsibilities/benefits for GLOS membership were generated and discussed within the GLOS Secretariat and GLOS-SC. Revisions to these documents will be made after the GLOS Board adopts a preferred membership structure and dues policies. The GLOS Secretariat has drafted Memoranda of Understanding/Agreement for federal agencies to become members of the GLOS-RA, but these documents still need to be approved by the GLOS Board before submittal to respective agency contacts. The GLOS Secretariat will continue to assist the GLOS Board on membership solicitation activities.

The GLC continues to provide staffing for the GLOS Secretariat. This arrangement should continue through June 30, 2008, as a function of the current NOAA planning grant. Assignment of a part-time GLOS Executive Director by the GLC still needs to be arranged between the GLOS Board and GLC management. The GLOS Executive Director will be responsible for a variety of data, communications, budgetary and administrative staff management.

During this reporting period, the GLOS Secretariat began planning for the first GLOS Annual Meeting and in-person Board of Directors meeting to be held in Ann Arbor, Mich., on June 19-20, 2006. During this meeting, the GLOS Board of Directors will establish all necessary committees, made up of representatives of the Board and membership organizations, to conduct normal business for the GLOS-RA. The draft GLOS Bylaws call for creation of a permanent Audit Committee and a Personnel/Elections Committee. Additional standing committees of the GLOS Board may be constituted at the Board’s discretion. Sub-system committees composed of subject matter experts will also be considered by the GLOS Board to engage its membership in defining future options for observing system components.

A major focus of the GLOS Secretariat during this reporting period was the development of the first GLOS Annual Work Plan. This plan identifies key activities, implementation responsibilities, timelines and budgets for the GLOS-RA for the period July 1, 2006, through June 30, 2007. This annual cycle corresponds with most state financial years within the region and generally corresponds with the NOAA grant cycle that funds the GLOS-RA. A draft of the

2006-07 GLOS Annual Work Plan was reviewed by the GLOS-SC in May 2006 and should be adopted by the GLOS Board at its inaugural meeting in June 2006.

B) Enhanced User Needs Assessment

A cursory user needs assessment took place as part of developing the final draft of the GLOS Business Plan. Over this reporting period, the GLOS Secretariat has continued to assess user needs in the following specific categories:

- Water supply protection in southeast Michigan along the St. Clair – Detroit rivers / Lake St. Clair waterway, lakes Huron and Erie Corridor (HEC);
- Overlake remote sensing observations to support monitoring of nutrient and sediment loading; and,
- Commercial navigation needs for improved channel conveyance forecasts for the St. Marys River, upper Great Lakes and the HEC.

Follow-on needs assessments will be outsourced to the Great Lakes Sea Grant Network as part of the outreach campaign. Additional needs assessments for observations to support the Great Lakes recreational boating community has not yet been conducted, but will be pushed as part of the GLSGN outreach campaign. Of particular interest are defining prospective improvements to near-shore marine forecasts used by all mariners across the system.

In its strategy report, released in December 2005, the GLRC recommended that specific activities be conducted by federal, state, county and municipal governments over the next five years to restore and protect Great Lakes ecological resources. These recommendations included a wide array of large-scale programs including restoration of coastal wetlands, protection of clean drinking water supplies, insuring safe public bathing beaches and reduction of toxics and non-point pollution loadings, all of which require an improved observing frame across the system. These drivers for improving the observing system functionalities are primarily focused on being able to adequately model and monitor spatial and temporal changes in loadings of contaminants, nutrients and sediments to the Great Lakes – St. Lawrence River system. The strategic goals expressed in the GLRC require greater spatial density of meteorologic, chemical, biologic and physical observations and integrated information resources including modeling and visualization.

One focal area of the GLRC Strategy Report was the Indicators and Information Strategy Team, which developed a 60-page report appendix that outlined strategic improvements for observation and monitoring programs across the region, implementation of indicator systems developed to measure progress, networking of information resources, research prioritization and improvements in communication systems. This annex outlines specific areas of focus for the GLOS-DMAC subsystem to address in years to come.

C) Sub-system Cost-Benefits Assessments

Specific cost-benefit assessments for proposed GLOS regional observing sub-system components have not been conducted during this reporting period, being deferred until the needs

assessments outlined above were completed. Methods will be developed in the second half of this grant year to support long-term prioritization of resource allocations and funding for subsystem improvements that can be implemented with programmed funding resources.

D) Regional DMAC Initiation

During this reporting period, the GLOS Secretariat further improved its web page for the enterprise, including prototype development of a regional web mapping engine to provide user friendly access to geospatial datasets. The GLOS website can be found at: www.glos.us. This web page provides comprehensive access to:

- background information on the GLOS initiative, including contact information for the GLOS Board of Directors, the GLOS-SC and GLOS Regional Interest Group (GLOS-RIG), the draft Business Plan, the draft bylaws and membership information;
- agenda and proceedings of all GLOS-SC meetings and conference calls;
- an events calendar;
- a User Needs Survey area;
- current lake conditions, including water levels, surface temperatures, meteorologic observations, weekly weather and water level forecasts, and links to an experimental buoy in Grand Traverse Bay;
- links to other collaborators including IOOS, RAs and supporting agencies, Great Lakes regional partners and relevant publications;
- Great Lakes news stories affecting observations and monitoring programs across the region; and,
- past GLOS Update articles, including those written during this reporting period.

During this reporting period, the GLOS regional DMAC effort has been focused on the system design requirements for incorporating the following information resources:

- a comprehensive binational (U.S. and Canada) monitoring inventory;
- NOAA's Coastwatch Great Lakes node;
- framework geospatial datasets and detailed geospatial mapping of coastal, open lake and riverine conditions collected under the International Joint Commission's Lake Ontario – St. Lawrence River Study;
- the water level gauging network maintained by NOAA's National Ocean Service, Center for Operational Oceanographic Products and Services;
- air emissions datasets from the eight Great Lakes states and the province of Ontario; and
- the integration of the Great Lakes Information Network (GLIN) as a clearinghouse node in the National Spatial Data Infrastructure (NSDI).

Additional geospatial data resources are being factored into the regional DMAC architecture, including open lake observations made from moorings and remotely sensed observations operated and maintained by universities across the region. This architecture is being implemented piecemeal as datasets become readily available for serving.

As identified in the GLOS Business Plan, all data distributed under the auspices of GLOS would meet IOOS DMAC certification requirements. GLOS technical supporters have attended all relevant national DMAC meetings (OOS-Tech, DMAC Steering Committee, etc.) to insure that regional development is being conducted in concordance with rapidly evolving DMAC protocols and certification requirements.

The conceptual architecture for the GLOS regional DMAC node has been drafted which addresses the following critical components:

- additional server capacity to support distributed geospatial data management;
- enhanced bandwidth to support data transfer between federal, state and academic data holdings;
- additional storage capacity to support regional data archiving and derived products;
- design concepts for ingesting data;
- general concepts for interdisciplinary product development; and,
- redesign of the Great Lakes Information Network (GLIN) to support product distribution.

Data ingestion will involve bringing in real-time in-situ observations, computer modeling output and raster datasets. In-situ observational data taken from sensor platforms (e.g., water level gauges, buoys) would be ingested in real-time using open source protocols (e.g., XML, Web Services, netCDF). Modeled outputs would be added including estimated, interpolated and forecasted values, such as weather and current predictions.

Product development is expected to include dynamic maps of in-situ observations highlighting the spatial distribution of phenomena across the Great Lakes or within their interconnecting waterways. Products would include graphs, statistics and animations depicting both real-time and historical phenomena to illuminate significant trends, events, etc.

Product distribution would be based upon evolving Web Services (e.g., Web Feature Service (WFS), Sensor Web Enablement (SWE) and SensorML formats) to ensure maximum interoperability of data among the disparate end users GLOS will serve. By utilizing common and standardized formats for data and using Web Services as a distribution channel, the GLOS-DMAC is designed to support a diverse group of end users, enabling the development of additional websites, further analysis, data conversion and other value-added operations.

E) Education and Outreach

The GLOS Secretariat has been working with the Great Lakes Sea Grant Network (GLSGN) to define an education and outreach campaign to promote the objectives of the GLOS-RA across the region. This broad public awareness campaign would involve newly formed coordinating committees with representation from the seven programs in the GLSGN. Education efforts will build information-sharing relationships between GLOS data providers and educators and their students. Outreach efforts seek to engage and inform potential GLOS user groups and to seek their input in GLOS design, implementation and product delivery. The 2006-07 GLOS Annual Work Plan identifies strategic activities for GLOS education and outreach activities, including:

- further assessments of user needs, gaps and deficiencies in existing services;
- design and promotion of a GLOS awareness campaign;
- development of promotional materials (e.g., fact sheets, news releases, newsletters); and,
- convening of workshops to highlight GLOS modeling and remote sensing initiatives.

Education planning will be coordinated with the Great Lakes Center for Ocean Sciences Education Excellence (COSEE). The Great Lakes COSEE was funded by the National Science Foundation in November 2005 to create dynamic linkages between Great Lakes and ocean research and education with the goal of enhancing scientific literacy and environmental stewardship. One of the program's key objectives is to improve communication between researchers and 4-10th grade teachers and students while enhancing teacher capabilities for delivering Great Lakes and ocean education. Over the five-year program, more than 2,000 teachers throughout the region are expected to take part in COSEE Great Lakes activities along with more than 350 researchers. Michigan Sea Grant will lead the curriculum development, focused heavily on educational opportunities afforded by the GLOS data integration efforts.

Other GLOS outreach activities include creation of periodic newsletters and implementation of a project Wiki. The GLOS Update e-newsletter is generated on a bimonthly basis, distributed to an increasingly wider user audience and posted on the GLOS web page. This communiqué was designed to provide GLOS and IOOS updates to a broad user community, including the GLOS-SC and GLOS-RIG lists and other partners. The GLOS Secretariat has also been providing updates for the Alliance for Coastal Technologies' Great Lakes Regional Chapter newsletter and for the Ocean.US newsletter.

The GLOS Wiki has been created to provide additional capacity for outside contributors to collaborate on the design and conduct of GLOS. The GLOS Wiki provides for a discussion forum between members of the GLOS Board, its committees, subsystem technical experts and others to exchange and archive information relevant to the endeavor.

Another key facet of GLOS outreach activities includes keeping congressional representatives apprised of ongoing developments across the region. The GLC has promoted GLOS-RA implementation as a critical regional initiative during the February 2006 Great Lakes Environmental Summit and March 2006 Great Lakes Congressional Breakfast and testimony all conducted in Washington, D.C. GEOSS implementation in the region has been one of the a few near-term funding recommendations from the GLRC strategy that were highlighted in the GLC's Legislative Priorities for the 2007 federal fiscal year. The GLC also passed a resolution at its May 2006 meeting in Sheboygan, Wis., to request Congress and regional stakeholders to support implementation of a three-dimensional continuously-operating flow model for the Huron-Erie corridor.

F) Coordination of Regional Backbone Observations

Initial efforts have been focused on working closely with NOAA's Center for Oceanographic Products and Services (CO-OPS) to link delivery of their water level and meteorologic

observations to the user community served by GLIN. Under the Regional DMAC initiative, GLOS staff has been designing interfaces to ingest NOAA/CO-OPS products into the GLOS web mapping application. GLOS staff has begun to work with U.S. Geological Survey staff to import stream gauge observations into the web mapping application.

Near-term improvements to NOAA's Great Lakes CoastWatch products including generation of daily lakewide surface products for chlorophyll, organic solids and surface sediment loads have been explored. These new products would be produced from existing space-borne sensor arrays including MODIS, SeaWiFS and AVHRR and delivered to end users on a daily basis. Each of these three operational products are needed to monitor organic, contaminant and sediment loads to the Great Lakes, which in turn can be used to assess performances on meeting water quality management targets. These products can be used to monitor harmful algal bloom development across the Great Lakes. The CoastWatch Program currently generates surface temperature maps from daily satellite observations and buoys in the Great Lakes. The GLSGN has enhanced these efforts by repackaging these maps for use by the charter fishing community who rely upon this product extensively (est. 4,000 visits per week) to determine the location of temperature gradients where fish may congregate. The GLOS Remote Sensing Subsystem is being designed around existing CoastWatch products and identified new requirements.

In July 2005, the GLC sent letters to the Director of the NOAA, National Weather Service (NWS), National Data Buoy Center (NDBC) representing the GLOS-RA which outlined the region's needs for additional sensor enhancements to the existing buoy network and densification of observations across the system to support improved nearshore marine forecasts. The observation programs of the NOAA-NDBC are a critical backbone component of the GLOS Open Water Subsystem. One of these letters specifically focused on maintaining existing meteorologic observations at the Lake St. Clair C-MAN site and upgrading this site to provide observations on current patterns and biological activity. The Lake St. Clair installation is a key observation node needed to model contaminant transport mechanisms within the HEC. During this reporting period, GLOS staff has continued to coordinate NDBC activities within the region.

NOAA's National Weather Service Central Region (NOAA-NWS) has undertaken an initiative to increase the density of coastal meteorological observations across the Great Lakes. This effort is in response to user needs for improved nearshore marine weather information and forecasts, and is designed to provide support as a component of the GLOS Nearshore Subsystem. It proposes to expand the number of NOAA coastal meteorological observations by 50 percent before 2012, with placement of critical observations determined through a priority gap analysis conducted collaboratively with NOAA-CO-OPS and NOAA-GLERL. To date, 10 new observations have been procured and installed in the western Great Lakes with plans for additional platforms in late 2006-07.

The GLOS Secretariat has been active in coordinating plans for the development and implementation of hydrodynamic modeling for the HEC, along with installation of dedicated Acoustic Doppler Current Profilers (ADCPs) in the St. Clair River, Lake St. Clair and the Detroit River. This activity is driven by the need to protect drinking water supplies for 4 million residents in Southeast Michigan and Southwest Ontario. These activities are components of the

GLOS Interconnecting Waterway Subsystem and engage elements in NOAA, the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, the U.S. Geological Survey, Environment Canada, and state and provincial agencies.

G) Regional Observing Systems Coordination

A major focus of the GLOS-RA during this reporting period has been continuing discussions with regional entities (primarily states and provincial agencies and academic institutions) to refine sub-system design and implementation planning for the period of 2007-12. These coordination activities have engaged subject matter experts in developing an integrated and cohesive vision for each of the following GLOS subsystems:

- Open Water
- Scientific Ships
- Nearshore Observing Systems
- Interconnecting Waterways
- Remote Sensing
- Atmospheric Monitoring
- Process Modeling and Ecological Forecasting
- Information Integration
- Education and Outreach

Many of these subsystems have little new investment planned for the immediate future. Nevertheless, regional coordination of stakeholder activities is still critically warranted, which is a role that the evolving GLOS-RA is best suited to provide. As opportunities arise, the GLOS-RA has supported coordination efforts. For example, GLOS staff has provided assistance to the Great Lakes Association of Scientific Ships (GLASS) in planning and conducting its annual meeting in January 2006. There are more than 100 members of the maritime community that convene on an annual basis to coordinate field data collection operations, share information resources and identify community priorities. The GLOS-DMAC is being designed to provide data sharing capabilities between members of GLASS.

Regional coordination has continued with each of the eight Great Lakes states during this reporting period, particularly dealing with design, development and implementation of the GLOS-DMAC. Each state maintains significant geospatial data resources which need to be accessible by the distributed web mapping portal being developed by the GLOS-RA. The needs of the State Coastal Zone Management (CZM) programs also are critical inputs in the design of GLOS subsystem improvements.

Additional Activities: The GLOS-SC conducted monthly calls through this reporting period, with the new GLOS Board participating on calls in April and May 2006. The majority of these discussions were focused on administrative needs to implement GLOS as a non-profit corporation, appoint its inaugural Board, assess progress of IOOS authorization and appropriations and regional interactions with the NFRA, Ocean.US and DMAC development teams. Minutes from these calls are posted on the GLOS web site.

Problems encountered: The final draft of the GLOS Business Plan was forwarded to Ocean.US and the NOAA Coastal Services Center in November 2004. To date, the GLOS Secretariat has not received any comments requiring revision. This document will need to be revised to reflect a more current portrayal of the organization, its programmatic objectives as defined by the GLOS Board of Directors, and all other requirements identified for RA certification by Ocean.US.

Full participation from all U.S. federal agencies engaged in the Great Lakes region still has not been achieved. Engagement of representatives from NOAA, U.S. Fish and Wildlife Service, U.S. Geological Survey and U.S. Coast Guard has been consistent, but intermittent on the part of the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. Canadian participation in the design and implementation of GLOS is expected to improve with appointment of two key academic representatives from Ontario universities with substantial systemic knowledge on the inaugural GLOS Board.

Soliciting buy-in from state organizations, academic institutions and non-governmental organizations (NGOs) has been a continuing challenge. Work conducted by the GLC Secretariat staff in support of the Great Lakes Regional Collaboration, particularly dealing with the Indicators and Information Strategy Team, has been instrumental in advancing the potential role of GLOS across the region. Continued engagement of the GLOS Board and Secretariat in the Great Lakes Water Quality Agreement review process over the next six months can highlight the importance that GLOS can provide in coordinating monitoring and research across the region.

Development of formal Memoranda of Agreement between the GLOS Board and major federal agencies within the Great Lake – St. Lawrence River system could be daunting. NOAA has as many as 19 weather forecast offices under 2 regions along with GLERL and supporting elements within the region, the USACE has three districts operating in the same domain and the USEPA has three regions, one regional office and one major research office operating across the region. The USGS has one regional coordinator but eight district offices that could need to be signatories to any GLOS membership agreement. The NFRA and Ocean.US agencies need to provide more assistance in insuring that partnering occurs at the highest practical level.

Due to the binational nature of the Great Lakes – St. Lawrence River system, monitoring of the meteorology, hydrology, hydraulics, biology, chemistry and physical attributes of the system need Canadian involvement. At present, engagement with Canadian counterparts is extremely limited, since there does not appear to be a commensurate investment on their side of the border in an integrated observing system. Binational coordination between U.S. and Canada need to be promoted by Ocean.US and by participating U.S. federal agencies.

Project schedule: Work on the project has been on schedule throughout this reporting period, with the following three exceptions: 1) filing of IRS documentation to request tax-exempt status as a non-profit corporation has been deferred for completion in August 2006; 2) initiation of detailed cost-benefit analyses on specific improvements to observing system components has been delayed until the second half of this reporting period to allow for completion of user needs assessments; and, 3) a formal education/outreach program has been deferred for start-up for fall

2006. Full completion of these two tasks is expected to be accomplished within the second year of the three-year grant period.

Project funding expenditures: Work through May 31, 2006, has required the expenditure of approximately 85 percent of the total funds provided under the first year of this multi-year grant (\$214,228.40 of \$248,332.00).

Changes to object class categories: No changes in object class categories have been warranted during this reporting period. It is anticipated that travel and contract expenses will need to be increased during the second year of the three-year grant period, with corresponding decreases occurring in the personnel, fringe benefits, equipment and miscellaneous categories. As such, a revised budget will be submitted on the SF424-A by Sept. 30, 2006, to seek prior approval of the Federal Program Officer and Grants Officer for transfer of funds among line item cost categories.

Change in principal investigator or other staff assignments: There have been no changes in principal Commission staff supporting this project during this reporting period.

Change in project period: None. All work outlined in the original proposal was completed in accordance with the grant period.